May 25, 2017

Mark S. Berry
Vice President, Environmental Affairs
Alternate Designated Representative
Georgia Power Company
241 Ralph McGill Boulevard, NE
Atlanta, Georgia 30308-3374

Re: Petition for the use of a multi-point sampling system for emission testing at multiple Georgia Power Company combustion turbine facilities

Dear Mr. Berry:

The United States Environmental Protection Agency (EPA) has reviewed the November 11, 2016 petition submitted under 40 CFR 75.66 by Georgia Power Company (GPC) requesting authorization to use a multi-point sampling system to perform nitrogen oxides (NO_X) emission rate testing at GPC combustion turbine facilities that are subject to the emissions monitoring requirements of 40 CFR part 75. EPA approves the petition in part, with conditions, as discussed below.

Background

GPC owns and operates 24 gas- and/or oil-fired combustion turbines that, according to GPC, are subject to Cross-State Air Pollution Rule (CSAPR) allowance trading programs for sulfur dioxide (SO_2) and annual and ozone-season NO_X emissions: Jack McDonough (ORISPL 710) units 3AA, 3AB, 3BA, and 3BB; McIntosh (ORISPL 6124) units CT1, CT2, CT3, CT4, CT5, CT6, CT7, and CT8; McManus (ORISPL 715) units 3A, 3B, 3C, 4A, 4B, 4C, 4D, 4E, and 4F; Robins (ORISPL 7348) units CT1 and CT2; and Wansley (ORISPL 6052) unit 5A.The units at McIntosh and Robins are also subject to the Acid Rain Program. GPC is therefore required to continuously monitor and report SO_2 and NO_X emissions and heat input for these units (and in the case of the McIntosh and Robins units, also carbon dioxide emissions) in accordance with 40 CFR part 75.

To meet the part 75 requirements for each of these units, GPC currently uses the low mass emissions (LME) methodology in § 75.19. Based on the historical operating data reported by GPC in the quarterly reports for the years 2014 through 2016, each of these units could also qualify for use of the excepted methodologies in appendices D and E to part 75 available for gas- and oil-fired units that meet the definition of a “peaking unit” in 40 CFR 72.2. In the November

11, 2016 petition, GPC notes that in the future GPC may elect to use the methodologies in appendices D and E instead of the LME methodology.

The appendix E methodology requires, and the LME methodology allows, NO_X mass emissions to be reported based in part on NO_X emission rates determined through periodic testing. Under both methodologies, the testing must be conducted according to procedures set forth in section 2.1 of appendix E. For combustion turbines, section 2.1.2.2 requires the NO_X emission rate testing to be performed at a minimum of twelve sampling points located according to Method 1 in appendix A-1 to 40 CFR part 60. The NO_X and oxygen (O_2) concentrations are measured at each sampling point according to Methods 7E and 3A in appendices A-4 and A-2, respectively, to part 60. Prior to commencing the measurements, the tester must allow the unit to stabilize for a minimum of fifteen minutes (or longer if needed for the NO_X and O_2 readings to stabilize). Then, the measurement system response time is determined according to sections 8.2.5 and 8.2.6 of Method 7E. When inserting the probe into the flue gas at the first sampling point in each traverse, a sample is collected for at least one minute plus twice the measurement system response time (or longer, if necessary to obtain a stable reading). For all other sampling points in each traverse, a sample is collected for at least one minute plus the measurement system response time (or longer, if necessary to obtain a stable reading). Three test runs are performed at each tested load condition and the results are averaged arithmetically.

Appendix E testing is usually conducted using a single-hole probe with manual traversing performed to each of the twelve sampling points. Use of multi-hole probes that sample at multiple sampling points simultaneously is not allowed for part 75 applications, absent EPA approval, because of the difficulty of ensuring equal simultaneous flow rates through each sampling point in a multi-hole probe.[1] If the flue gas is stratified (i.e., if the flue gas composition is not uniform across the stack), a multi-hole probe with unequal flow rates at the sampling points would provide a mixed gas sample that would not be representative of the average flue gas composition across the sampling points. Unrepresentative gas samples in turn would lead to unrepresentative appendix E test results. Because appendix E test results are key inputs to determination of the NO_X mass emissions data reported for the tested units, it is very important for the flue gas samples that are analyzed to be representative of the average flue gas composition.

Scheduling emissions tests for peaking units can be challenging because these units generally operate on an as-needed basis, during periods of peak electricity demand, and it is often not possible to predict when those periods will occur. As a result, an appendix E or LME unit may be forced to operate in order to meet a test deadline at times when the unit would not otherwise operate. In an effort to reduce the amount of otherwise unnecessary operating time required to conduct appendix E testing at peaking units, GPC has developed a multi-point system (SIMPAT) that samples at twelve points simultaneously, using four bundles of three probes each, and continuously measures the NO_X, O_2, and carbon monoxide (CO) concentrations in the flue

[1] § 75.22(a)(5)(iii); *see also* section 8.4(3) of Method 7E in appendix A-4 to part 60.

gas. The gas from the twelve simultaneous samples is mixed into a single consolidated sample prior to analysis. By using multiple probes that are positioned at all necessary sampling points at the start of each test, the SIMPAT system eliminates the operating time that would otherwise be required to relocate the sampling probe and to allow the measurement system to restabilize after each relocation. The SIMPAT system is currently patent-pending.

GPC has developed a quality assurance and quality control (QA/QC) program for the SIMPAT system to ensure that the flow rates at the individual sampling points are close to one another so that the analysis of the mixed gas samples will provide representative data. Two important elements of the QA/QC program are the pre-test and post-test flow rate checks. Prior to each test, GPC assembles the system at the test location. With the four sample probe bundles outside of the stack, a vacuum pump is activated to produce a pressure of at least fifteen inches of mercury in order to establish the desired flow rate through the whole system.[2] The flow rate at each of the twelve sampling points is then measured using a NIST-traceable Bios digital flow meter (or equivalent). GPC proposes to consider the SIMPAT system ready for use if the flow rate at each sampling point is within 10 percent of the mean flow rate across all points.

Since it is not possible to measure the flow rate through each individual sampling point during the actual emissions test, the flow rate through the sampling system is kept constant instead, using a series of five rotameters (one to measure the flow rate through each bundle of three probes and one to measure the total flow rate). After the test is complete, the post-test check of the flow rate through each of the twelve points is performed. GPC proposes that if the 10 percent criterion is met once again, the test data should be considered acceptable.

In order to demonstrate the capability of the SIMPAT system, GPC performed a series of emission tests at two GPC facilities. At GPC's Plant McIntosh, two simple cycle turbines (Units CT7 and CT8) were tested, comparing NO_X and O_2 concentration measurements made with SIMPAT against measurements made using Methods 7E and 3A. At GPC's Plant McDonough, a combined-cycle combustion turbine (Unit 5B) was tested by direct comparison of SIMPAT measurements against measurements from a certified part 75 NO_X CEMS, and the accuracy of the CEMS was then confirmed using Methods 7E and 3A. For all of these tests, the pre- and post-test checks of the flow rates through the individual points met GPC's proposed 10 percent criterion—specifically, the deviations of the flow rates at the individual sampling points ranged from 3.7 to 6.3 percent of the mean flow rates across all sampling points. A summary of the test results is presented in Tables 1 and 2 below.

[2] The exact vacuum pressure needed to achieve this flow rate depends somewhat on the ambient conditions. Also, the vacuum must be sufficient to ensure that that the optimal flow rate through the gas analyzers is achieved.

Table 1: Comparison of SIMPAT System vs. Reference Methods (RM) 7E and 3A at McIntosh Units CT7 and CT8

Name	Run No.	NO_X (ppmvd) RM 7E	NO_X (ppmvd) SIMPAT	O_2 (%vd) RM 3A	O_2 (%vd) SIMPAT	NO_X Rate (lb/mmBtu) RM	NO_X Rate (lb/mmBtu) SIMPAT
McIntosh CT7	**Low Load**						
	Run 1 **Run 2** **Run 3**	17.87 18.32 19.04	19.78 19.79 20.60	15.61 15.61 15.59	15.87 15.87 15.87		
	3 Run Average	**18.4**	**20.1**	**15.6**	**15.9**	**0.075**	**0.087**
	High Load						
	Run 1 **Run 2** **Run 3**	23.70 23.71 23.05	23.70 23.79 23.80	14.32 14.45 14.70	14.52 14.51 14.51		
	3 Run Average	**23.5**	**23.8**	**14.5**	**14.5**	**0.080**	**0.081**
McIntosh CT8	**Low Load**						
	Run 1 **Run 2** **Run 3**	16.64 16.77 17.02	17.72 17.63 17.73	15.78 15.79 15.87	15.90 15.93 15.87		
	3 Run Average	**16.8**	**17.7**	**15.8**	**15.9**	**0.072**	**0.076**
	High Load						
	Run 1 **Run 2** **Run 3**	23.30 23.24 23.77	24.40 24.53 24.58	14.39 14.40 14.38	14.39 14.49 14.48		
	3 Run Average	**23.4**	**24.5**	**14.4**	**14.5**	**0.078**	**0.082**

Table 2: Comparison of SIMPAT System vs. a Certified Part 75 CEMS at Jack McDonough Unit 5B

Date	Measurement System(s)	Unit Load (MW)	NO_X (ppmvd)	O_2 (%vd)	NO_X Rate (lb/mmBtu)
6/15/2016	SIMPAT	238	3.9	11.9	0.009
6/15/2016	CEMS	238	3.8	11.8	0.009
Confirmation of CEMS Accuracy vs. Reference Methods 7E and 3A					
6/15/2016	Methods 7E and 3A	235	3.8	12.0	0.009
6/15/2016	CEMS	235	3.8	11.8	0.009

Based on these test results and other information included in the petition and in the accompanying test report, GPC has requested permission to use the SIMPAT system to perform the future NO_X emission rate tests of the 24 combustion turbines identified above as well as any other combustion turbines subsequently installed at GPC facilities.

EPA's Determination

EPA has reviewed the November 11, 2016 petition and the supplementary information provided by GPC in the emission test report and subsequent e-mails. For the following reasons, EPA has determined that the SIMPAT system is capable of providing acceptably accurate appendix E test results for the units that GPC tested (i.e., gas-fired and/or oil-fired combustion turbines). First, the system is expressly designed to ensure equal or nearly equal flows at all sampling points through the use of bundles of three individual single-hole probes at the four stack sampling ports (in contrast to the use of multi-hole probes) and the use of rotameters to measure the flow rates through the bundles of probes. Second, GPC proposes to use the SIMPAT system only for gas- and oil-fired peaking units, where the risk of a probe being plugged by particulate in the flue gas stream (which would reduce the flow rate through that probe) is lower than for a coal-fired unit. Third, GPC's proposed quality control procedures – specifically, the pre-test flow rate checks, monitoring of the rotameters for equal flow rates through the four probe bundles during the tests, and the post-test flow rate checks – would provide reasonable assurance that the system is actually achieving flow rates within the specified maximum

deviation during the emission tests. Finally, GPC's demonstrations indicate that the system is capable in practice of operating within a reasonable flow rate deviation criterion and producing emission test results comparable to the results of other accepted monitoring and testing methodologies.

Instead of GPC's proposed 10 percent deviation criterion, EPA approves use of a deviation criterion of 7.5 percent. As discussed above, it is important that appendix E tests be performed on representative flue gas samples in order to ensure the quality of the reported NO_X emissions data. GPC's tests achieved deviations between 3.7 percent and 6.3 percent, demonstrating that a deviation criterion more stringent than 10 percent is readily achievable. A deviation criterion of 7.5 percent is approximately double the best deviations shown in GPC's demonstrations and 120% of the worst deviation shown in the demonstrations.

Therefore, EPA approves the use of the SIMPAT system for appendix E NO_X emission rate testing (for use under either the appendix E methodology or the LME methodology) at the combustion turbines listed in GPC's November 11, 2016 petition and in this response, as well as any other combustion turbines subsequently installed at GPC facilities, subject to the following conditions:

1. GPC may use the SIMPAT system only for NO_X emission rate testing of Appendix E peaking units and LME combustion turbines that burn natural gas and/or diesel oil.

2. During each test, GPC shall ensure that the rotameters used to verify the sample flow rates are in operation at all times and, to the extent practicable, that equal flow rates are maintained through each of the four probe bundles.

3. Before beginning each test run with the SIMPAT system, GPC shall ensure that the system is checked for bias, and that the probe assemblies are checked for proper flow rate and are allowed to equilibrate for at least twice the system response time. Each test run shall consist of a minimum of 21 minutes of data. This minimum sampling time does not include the time required to ensure that the system has obtained stable stack gas readings.

4. GPC shall ensure that for each test performed with the SIMPAT system, a pre-test and a post-test check of the flow rates through each of the twelve sampling points is performed at the test location (e.g., platform) using a NIST-traceable reference flow meter. For each check, the percent difference between the flow rate at each sampling point and the average flow rate across all points shall not exceed 7.5 percent (absolute value).

5. GPC shall ensure that the total sample flow rate through the SIMPAT system during each test is high enough to provide the optimum flow rate to each gas analyzer. Any excess sample shall be vented to ensure proper operation of the system.

EPA's determination relies on the accuracy and completeness of the information provided by GPC in the November 11, 2016 petition, the supplementary emission test report, and several e-mail correspondences, and is appealable under 40 CFR part 78. If you have any questions regarding this determination, please contact Carlos R. Martinez at (202) 343-9747. Thank you for your continued cooperation.

Sincerely,

/s/
Richard A. Haeuber, Acting Director
Clean Air Markets Division

cc: David McNeal, EPA Region 4
Dan McCain, Georgia EDP
Carlos R. Martinez, CAMD